

# ZENO® CAM 3.2

User Manual





# Table of contents

■ 1 Introduction .....	p. 4
■ 2 The main menu .....	p. 5
2.1 Create new blank .....	p. 6
2.1.1 Reading data into the ZQS system .....	p. 6
2.2 Load existing blank .....	p. 7
2.3 Settings .....	p. 8
2.4 Insert job .....	p. 8
■ 3 Process job .....	p. 9
3.1 Select blank .....	p. 10
3.2 Position job .....	p. 11
■ 4 Calculation options in the main menu .....	p. 13
4.1 Simulation .....	p. 14
4.1.1 Edit CAM blocks .....	p. 14
4.1.2 Simulation menu .....	p. 15
4.2 Generate milling data .....	p. 16
4.2.1 Milling dialogue .....	p. 16
4.2.2 Processing mode .....	p. 16
4.2.3 CAM blocks .....	p. 17
4.2.4 Generate milling data .....	p. 18
■ 5 Link milling data .....	p. 19

# 1 Introduction

- This user manual will guide you safely through the CAM\* process. It describes the individual stages of the process in detail.

Following the scanning process and the modelling stage using the CAD software, the CAM process represents the third stage in the computeraided manufacture of dental restorations.

The **ZENO® CAM 3.2** software helps you to manage and process your blanks. The program enables you to position a restoration in a blank, set bars and drops and to generate the milling data for the milling machine.

This user manual describes the complete CAM sequence required to make a bridge in **ZENO® Zr**. All the necessary operations are menucontrolled and automated. All program functions are explained with the aid of screenshots.

\* **CAM:** Computer Aided Manufacturing



## 2 The main menu

The following menu items are selected by direct mouse click on the relevant icon.

### ■ Insert job:

If the required blank has already been set up, click on this button to add a job to the blank. Then the appropriate blank can be selected.

### ■ Create milling data

With this button you can calculate the milling paths for a blank in which one or more jobs have already been placed. This calls up a window in which you can select and load the required blank and job. You will find more detailed information on the function "Create milling data" in Section 4.2 "Create NC Data" on page 16.

### ■ Create new blank:

Here you can create and store a new blank.

### ■ Load existing blank:

Here you can load and view a blank you have already created. To do so, just click on the icon.

### ■ Simulation

With this button you can simulate the milling paths for a blank in which one or more jobs have already been placed. This calls up a window in which you can select and load the required blank and job. You will find more detailed information on the function "Simulation" in Section 4.1 "Simulation" on page 14.

### ■ Print data for blank:

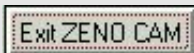
If a default printer is connected and specified in the "Settings" menu, you can print out the data of the blank specified in the following menu.

### ■ Settings:

This takes you to the "Settings" menu.

### ■ Exit:

The whole program can be closed by clicking the



button. The red cross in the top right-hand corner of each window has the same function.



## 2.1 Create new blank

- Ensure that your ZQS scanner is connected.

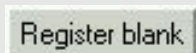
To do so, click on "Create new blank" in the main menu. The window shown in the screen shot appears.

### 2.1.1 Reading data into the ZQS system

- Place the data plate supplied with the blank on your ZQS scanner and click on:

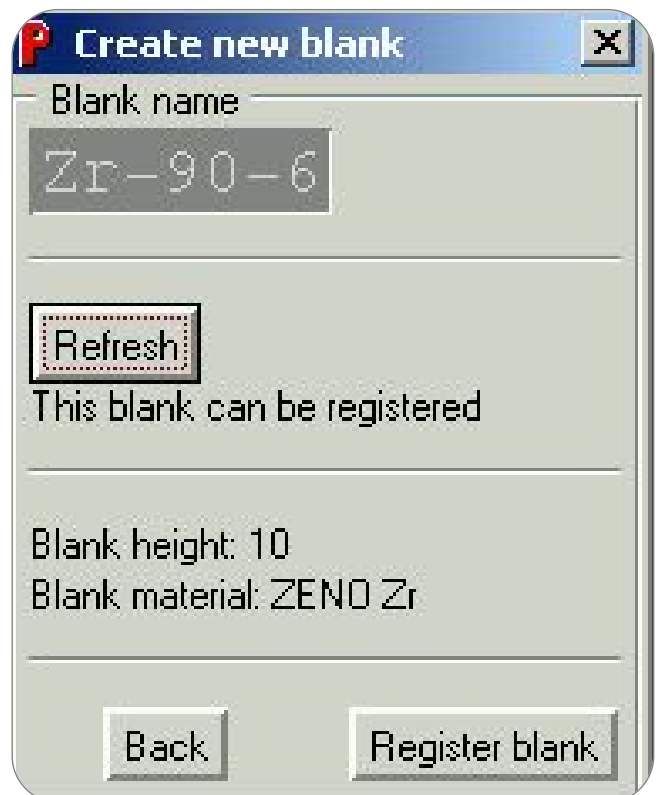


- The height of the blank and the material are indicated in the window shown here. If you wish to register this blank, click on:



- The name of the blank is taken over directly from the blank itself.
- The system returns to the main menu. The new blank is now registered.

**Please note:**  
Each blank can only be registered **once**.



## 2.2 Load existing blank

- Click on the **Load existing blank** icon in the main menu. The window shown on the right appears. Here all the blanks that have been created can be viewed in the preview window at the bottom right. Simply select the required blank from the menu.

- You can also locate a blank by the of the ZQS scanner system. To do so, place the appropriate ZQS label on the scanner and click on:

Search blank via ZQS

- Here you can also delete a finished blank. To do so, select the blank to be deleted and click on:

Delete

- To view detailed information select the required blank and job and then left click on:

Load

- The current job can then be recalculated.

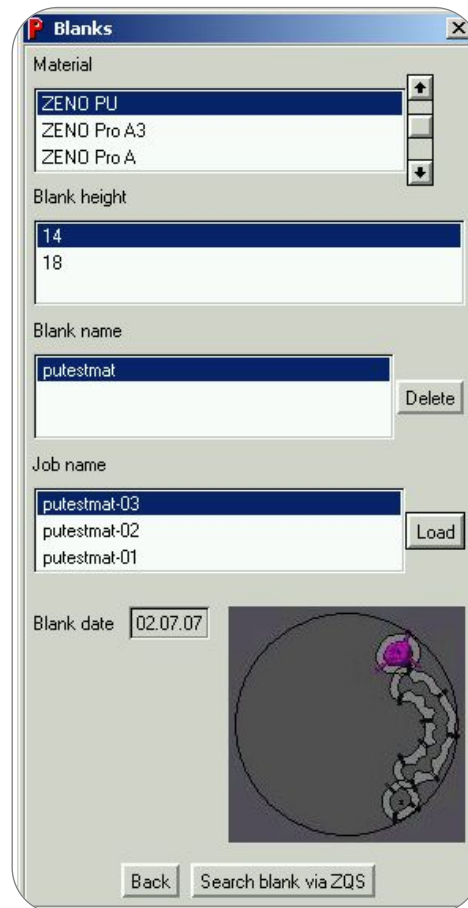
- You are now returned automatically to the main menu. The buttons **Generate milling data** and **Simulation** are now activated in the menu and can be used.

- You will see the selected blank in the background of the main menu. The jobs already placed in the blank are highlighted in purple or grey. The simulation can now be launched for the jobs displayed in purple or the software can calculate the milling data for these. It is necessary to calculate the milling data so that the jobs can subsequently be passed on to a milling machine.

### Please note:

Only the data from the jobs highlighted in purple will be calculated. Similarly, simulations can only be carried out for jobs shown in purple.

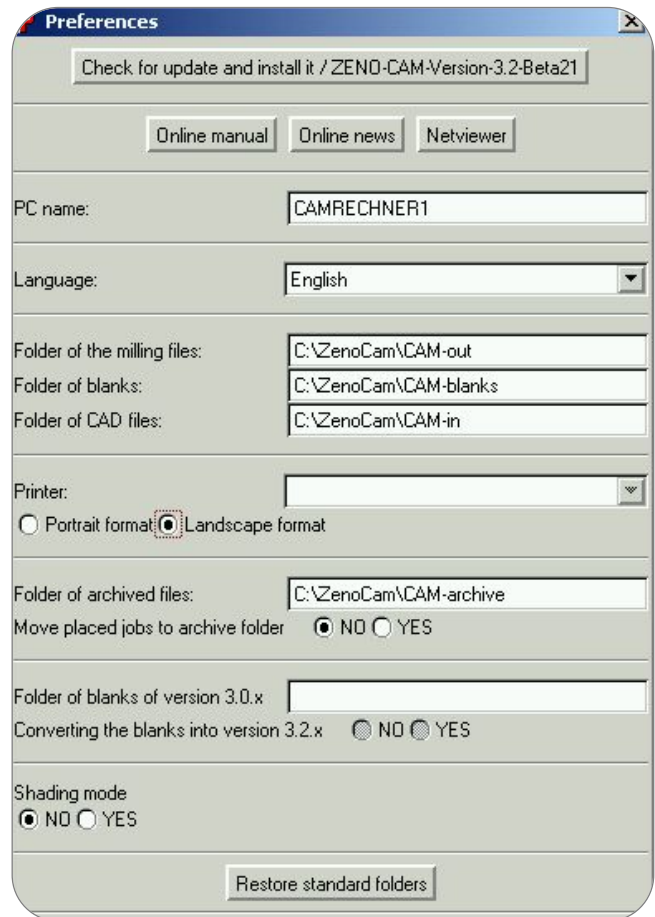
- For more detailed information on the **Simulation** function, refer to Section 4.1 "Simulation" on page 14.
- For more detailed information on the **Create milling data** function, refer to Section 4.2 "Generate CNC data" on page 16.



## 2.3 Settings

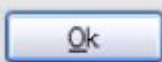
- Click on the **Settings** icon in the main menu. The menu shown on the right appears. The individual menu items are largely self-explanatory. For this reason, only the following functions of this menu are described here.

- Internet update
- Online user manual
- Remote maintenance
- Language selection
- Directory paths
- Printer connection
- Archiving of finished jobs
- Retain existing data in the case of an update conversion

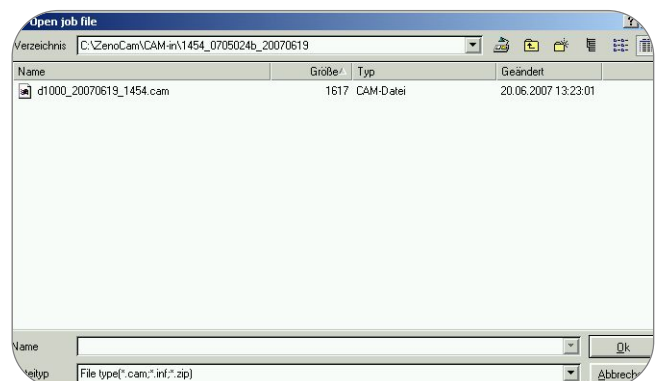


## 2.4 Insert job

- In order to process a new job file, left-click on the **Insert Job** icon in the main menu. (This brings up the window shown on the right.) By default, all jobs completed with the CAD program are automatically stored in the folder "CAM-in". The full directory path of this folder is "C:\ZenoCam\CAM-in". Here you can select the job required and open it by clicking on the



button.





## 3 Process job

- Once you have opened a job file you will first see a 3-D preview of the job together with selected data, e.g. the material and the height of the job. The program uses this information to automatically select a suitable blank from your data base.
- If the file selected in this way is not the right one, you can go back one step and select a different file. To do this, click on the button

Open another job file

- If you want to insert this job into a blank, click on the button

Next

- Should you want to go right back to the main menu, click on the button

Back

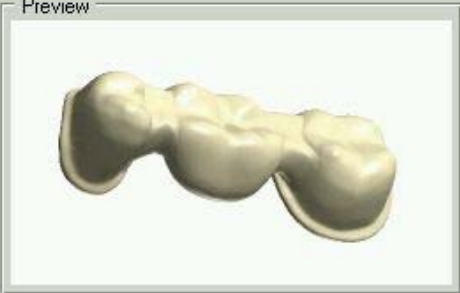
**Job selection**

Open another job file

CAD manufacturer: 3shape  
Software version: 2007-1 build (1.2.5.29)  
Operator:  
Date: 19.06.2007  
External order number: SintPara3gl.com  
Company: Wieland  
Internal order number:  
Delivery address:  
Billing address:  
Dispatch type:  
Delivery date: 20.06.2007

Material: ZENO Zr      Job height: 12.73

Preview



Job name: d1000\_20070619\_0957\_1  
Type: bridge  
Dental scheme: B  
Angle A = 0  
Angle B = 0  
Worked on: No

Back    Next

If a job is loaded into a blank for a second time, the step is indicated in red not in black.

## 3.1 Select blank

- Once you have selected the job to be processed, the corresponding blank must be selected. The blanks are sorted according to material, blank height and blank name. For each job, a suitable blank is automatically suggested. However, you can select a different blank manually. You can also use the ZQS scanner system to select the required blank.
- **Active blank - passive blank:**

If previously positioned jobs are to be calculated along with the current one, select **Active blank**. The blanks subsequently calculated in this way are highlighted in purple. If the new job is to be calculated on its own, select **Passive blank**. The previously positioned blanks will now be shown in grey.
- **Milling strategy:**

You can select from a choice of different milling strategies. The strategies can differ in milling speed, surface quality and tools used.
- **Optimising the height:**

You can have the software calculate the minimum height of a bridge for you. Once this calculation has been carried out, the standard and the ideal heights of the job are indicated. Now you can decide whether or not to use the optimised value.
- **Job view:**

Here you have another opportunity to see the job as a 3-D image.
- **View in the blank:**

Ensure that the job can be correctly positioned in the selected blank. You can return to the **Blanks** menu by pressing the **ESC** key or by clicking the right mouse button. When you have entered all the settings required, click on the button

**Next**

, in order to proceed to the next step.

### Please note

Height optimisation can not be carried out for single crowns or telescopic restorations. The use of the height optimisation function only makes sense if a thinner blank can be used. This reduces milling time and saves material. During height optimisation the blank is rotated according to the insertion direction. This is why you can only turn the job by 180° when using the height optimisation function. If height optimisation is not used, the job can be rotated freely in the blank.

The screenshot shows the 'Blanks' window with the following settings:

- Material:** ZENO Zr (selected), ZENO Ti, ZENO PU
- Blank height:** 14 (selected), 18, 20
- Blank name:** Zr-89-1085, Zr-89-792, Z1401 (selected)
- Milling strategy:** [ZENO Zr] [crown] V3.2 - 2.5mm (selected), [ZENO Zr] [crown] V3.0 - 1.0mm
- Blank empty** ☒ **Blank full** ☐
- Blank date:** 16.03.07
- Job height:** 10.61
- View of job** (button)
- View within blank** (button)
- Back** (button)
- Search blank via ZQS** (button)
- Next** (button)

## 3.2 Position job

- Once the required blank has been selected, the job can be positioned.

### ■ Positioning along the XY axes:

Click on the icon to view the blank from above. Click on the centre of the circle to move the job along the XY axes. Click on the edge of the circle to rotate the job. You can then use the mouse to drag the job into the correct position. When the job is correctly positioned, click the **left mouse button** once more.

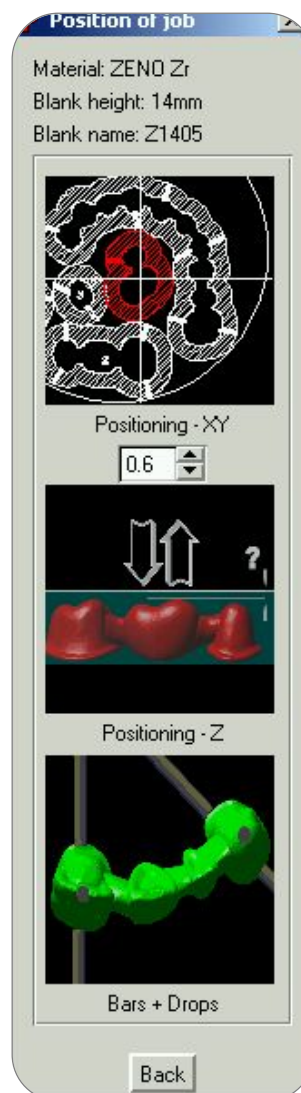
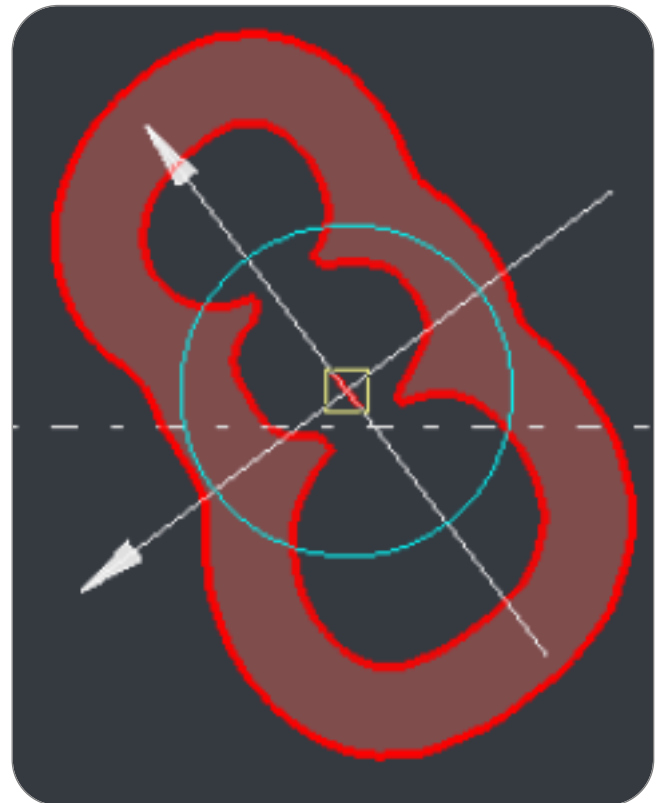
**N.B.:** When the height optimisation function is used for telescopic restorations or abutments with different milling angles, the job can not be rotated freely. In this case the job can only be rotated through 180°. A fourth menu icon is displayed. Now press the **ESC** key or the **right mouse button** to call up the menu **Position job**.

### ■ Positioning in the Z axis:

Clicking on the icon brings up a side view of the blank. By default, the job is positioned at a distance of 1 mm from the top of the blank. This distance should under no circumstances be less than 0.3 mm. In such a case the software would suggest the next thicker blank during the blank selection process.

You can change the position along the Z axis manually by entering the required distance from the top in millimetres in the entry field (  ).

In order to see an image of the changes, click again on the icon **Positioning in the Z axis**.



## ■ Bars and drops:

- Click on the icon to set the retaining bars and/or drops. This opens up a new menu. Click on the icon **Create bar** or **Create drop**. The correct diameter for material used is indicated but this can be changed manually.
- **Bars** are set directly by clicking on the edge of the job. The bar is automatically aligned at an angle of 90° to the edge of the restoration.
- Once you have set the bars, press the **ESC** key or the **right mouse button** to return to the selection menu.
- **Drops** are positioned occlusally at the required position on the job. The currently selected bar or drop is highlighted in red.
- Bars and drops can be dragged to the required position by means of the Move menu box. To do this, first select the required bar or drop by clicking on the **Select** icon:



- To delete a bar or drop, click on the **Delete** icon:



and select the object to be deleted.

- The **View** menu allows you to view the job from different perspectives or to rotate it by using the appropriate buttons.

## ■ Using the mouse to change the view:

First move the cursor over the image of the job.

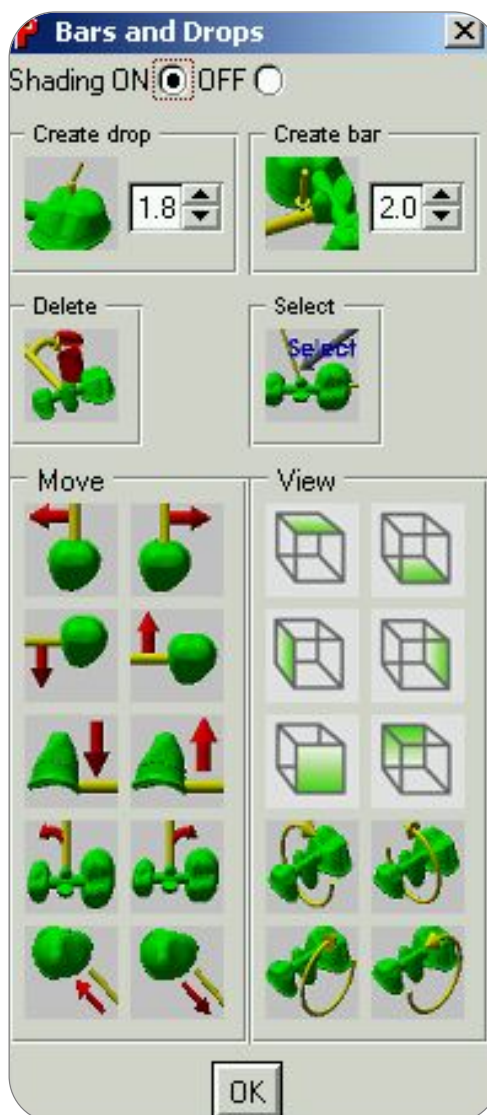
- **To rotate the job:**  
Hold the right mouse button down and move the mouse to rotate the job.
  - **To move the job:**  
Hold the mouse wheel down and move the mouse to drag and drop the job.
  - **To zoom in and out:**  
Move the mouse wheel.
- Once you have moved all the bars and drops in the required positions, confirm this by clicking:



The **Position job** menu is displayed again. Once you have entered all the settings, click on the button



to proceed to the next step.



## 4 Calculation options in the main menu

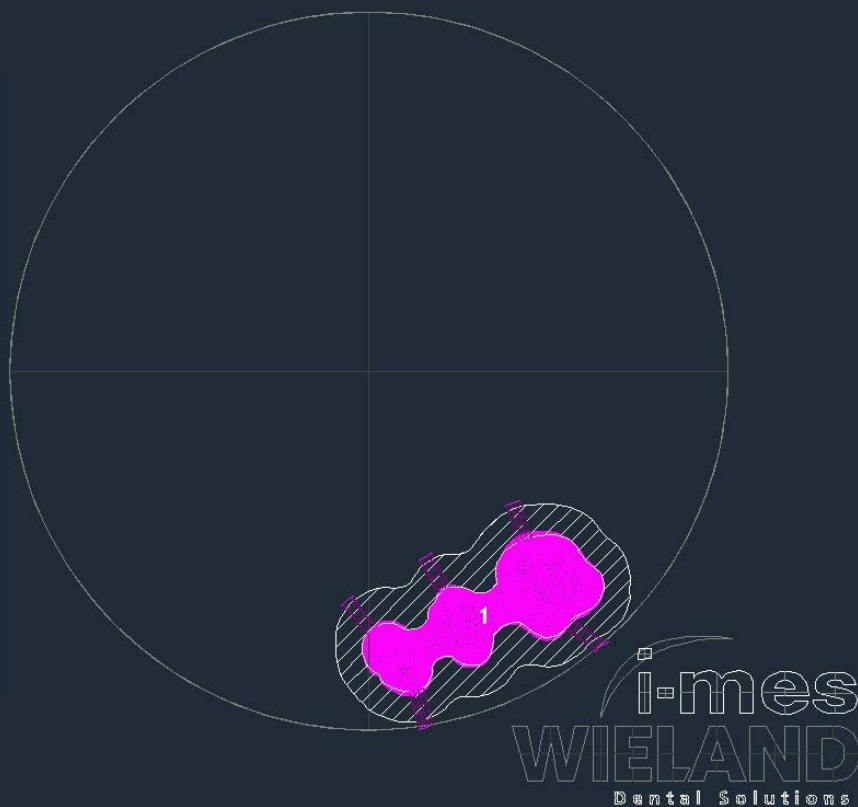
- Once you have finished positioning the job in the blank, the main menu is displayed once more. If you wish, you can now insert a further job into this blank in order to subsequently generate milling data for several jobs. To do so, click once more on the Insert job icon. The cycle begins again from the beginning.

In addition, two extra buttons now appear in the main menu:

**Create milling data** and **Simulation**.

The data is generated for the jobs highlighted in purple. If you want to skip the simulation, go on to Section 4.2 "Create milling data" on page 16.

1=d1000\_20070620\_0921\_1





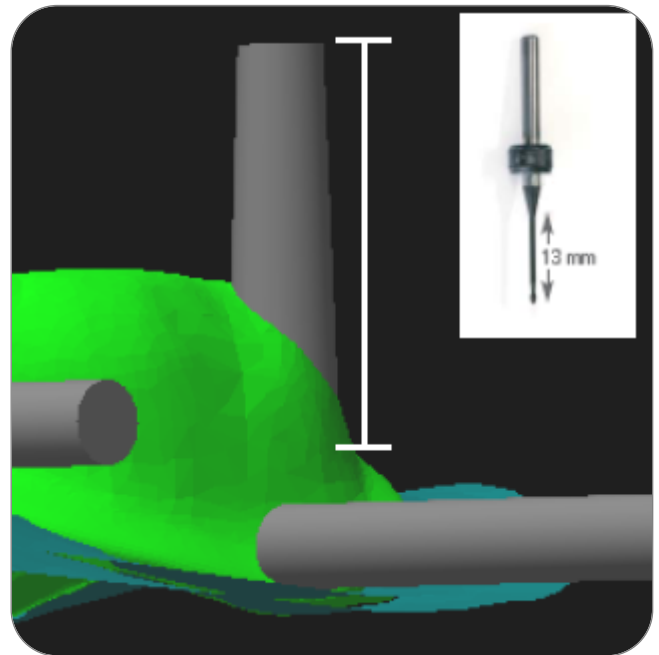
## 4.1 Simulation

- This function allows you to simulate the milling process.

The simulation is not absolutely essential. The advantage of the simulation is that it enables potential tool collisions to be identified and averted.

Tool collisions can occur, for example, with very high constructions. This is especially relevant in the case of constructions with drops. Tool collision means that the job makes contact with the shaft of the bur. This event can cause the ZrO<sub>2</sub> object to fracture at the point of contact. The shaft of the bur shown in the illustration starts at 13 mm. If the long side marked white in the illustration alongside exceeds 13 mm, then there is a risk of the bur shaft colliding with the drop. You can avoid this by positioning the drops more centrally over the elements. This shortens the length of the drop which has to be milled.

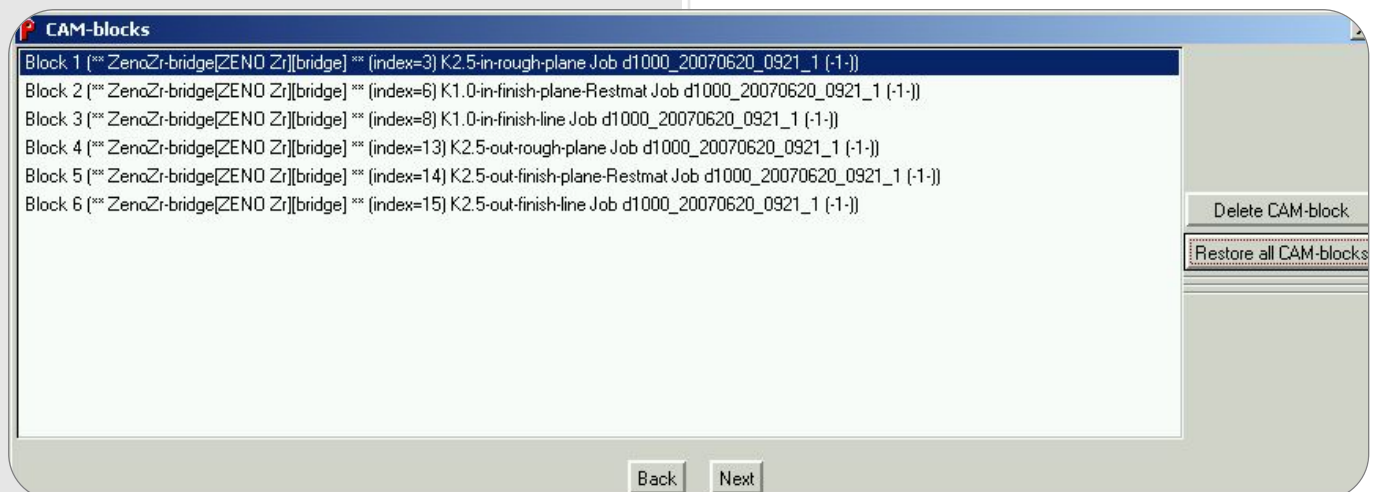
If you are still not sure, you can simulate the milling process in order to completely eliminate any danger of collisions. To do this, click on the **Simulation** Button.



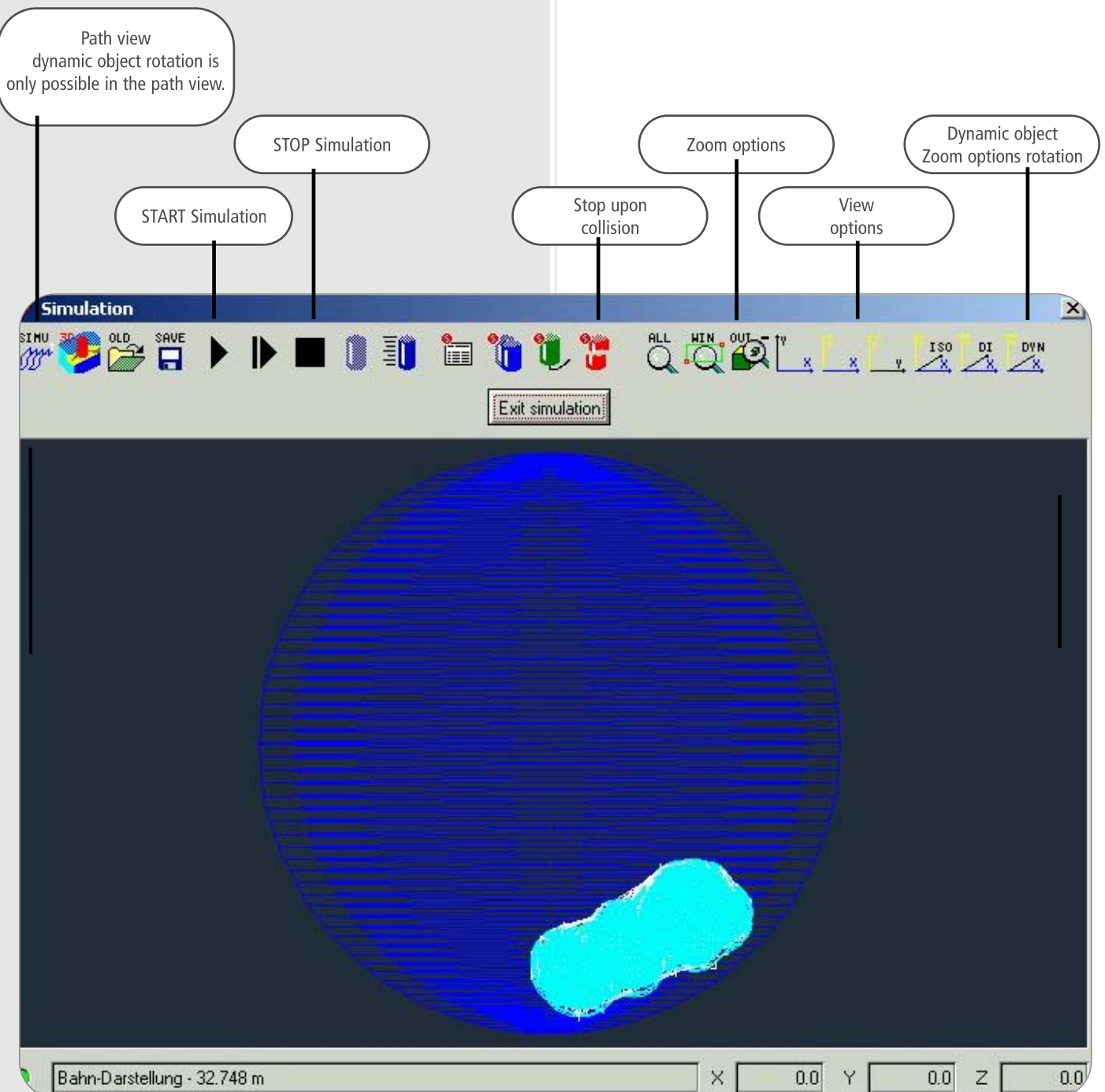
### 4.1.1 Edit CAM blocks

- To start with, all CAM blocks are displayed that correspond to the milling strategy selected in Section 2.1. For example, if you only want to view the simulation for the external side, you can remove the interior milling blocks. In the example shown, this means blocks 1 to 3. The sequence of blocks must not be changed. You can find more detailed information on the function Edit CAM blocks in Section 4.2.3 "Edit CAM blocks" on page 17. Once you have made your selections, confirm them by clicking

Next

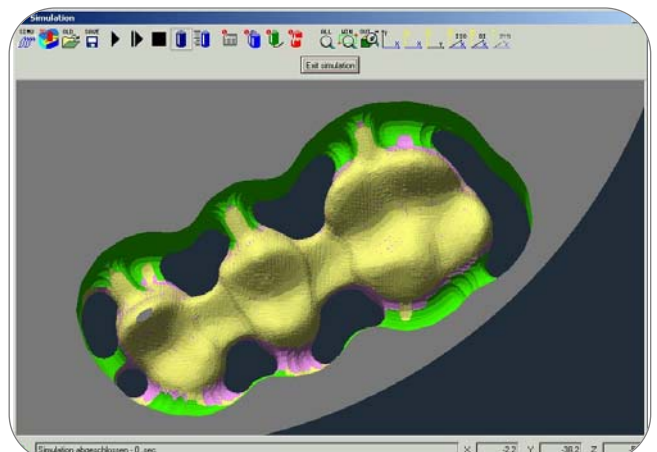


## 4.1.2 Simulation menu



**Please note:** Once the simulation has started, the blank can no longer be rotated. Rotate the blank into the required position before launching the simulation. Tool collisions are shown in red. In the example, no tool collision can be seen. To end the simulation, click on the button

Exit simulation



## 4.2 Generate milling data

- In order to calculate the machining paths for the milling process, click on the **Generate milling data** icon in the main menu.

### 4.2.1 Milling dialogue

- You have two options: **Generate milling data** or **Link milling data**.

**N.B.:** You can only link milling data if you have previously generated the data to be linked. The **ZENO® CAM software can only link data for the milling machine type ZENO® 4030**. For all other machine types the linking is done directly in the machine.

- You must therefore always first select **Generate milling data** and confirm your selection by clicking

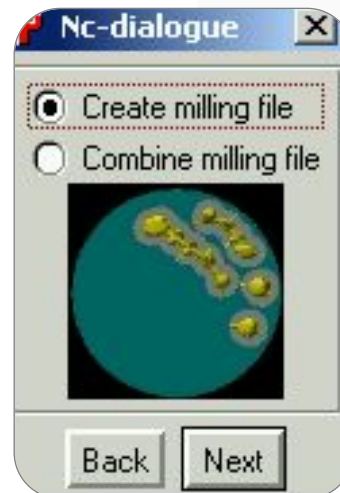
Next

### 4.2.2 Processing mode

- **Select holder:**  
Select whether the job is to be milled in the left-hand or right-hand holder. For the **ZENO® 3020 machine**, always select the left-hand side.

**Please note:** If you want to link the individual jobs of a single blank with one another at a subsequent stage, you must always select the same holder for all the jobs in a blank.

- **Processing sequence:**  
The processing sequence is only relevant if several jobs are being calculated at the same time.
  - **Inside first:** (tool oriented)  
All jobs of the respective blank will first be fully milled on the inside, then on the outside.
  - **Sequential** (job oriented)  
The first job is completed first, then the second, then the third and so on.





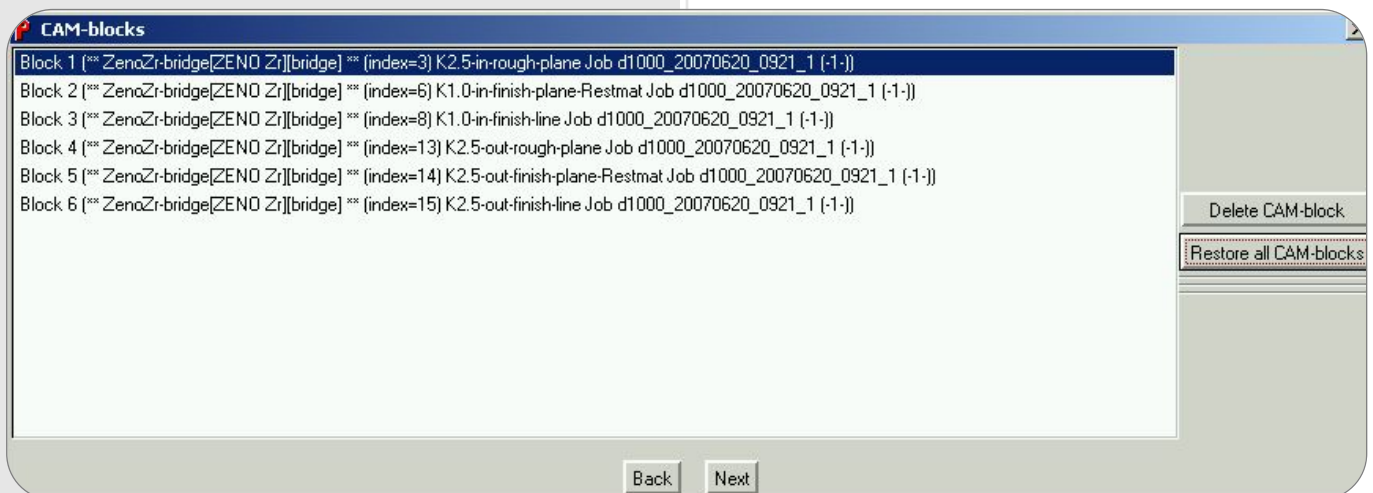
## 4.2.3 CAM blocks

- First of all the CAM blocks are displayed in accordance with the milling strategy selected under Section 3.1. The sequence of the blocks must not be changed. With certain milling strategies you can remove certain blocks later if you wish.
- **Meaning of the milling blocks:**
  - **K2.5 in-rough-plane:**  
Circular roughing of the inside with a 2.5 mm bur.
  - **K1.0-in-finish-plane:**  
Circular finishing of the inside with a 1.0 mm bur.
  - **K1.0-in-finish-line:**  
Linear finishing of the inside with a 1.0 mm bur.
  - **K2.5-out-rough-plane:**  
Circular roughing of the outside with a 2.5 mm bur.
  - **K1.0-out-finish-plane:**  
Circular finishing of the outside with a 1.0 mm bur.
  - **K1.0-out-finish-line:**  
Linear finishing of the outside with a 1.0 mm bur.
- For a given milling strategy, you can, for example, delete the two blocks "K1.0-out-finish-plane" and "K1.0-out-finish-line". The result will then be a rougher finish on the outside. However, machine time and tool wear will be reduced.
- Once you have made your selections, confirm by clicking

Next

The milling data will now be generated.

Changing the sequence or making deletions can cause the tool to break.



## 4.2.4 Generate milling data

- Once you click on



in the "CAM blocks" menu, the milling data is generated automatically. Depending on the size of the milling file, this process can take several minutes. Once the milling data has been generated you will see a message window like the one shown on the right. This message tells you the directory path of the milling data file and the estimated milling time.

**Please note:** The milling time depends on both the type of machine and the machine parameters and can therefore deviate from the time shown.

- Click on



The process is now complete.

Milling file was created!  
C:\ZenoCam\CAM-out\ZAW02-01.ncp  
C:\ZenoCam\CAM-out\ZAW02-01.nc  
Estimated milling time = 00:32:00



## 5 Link milling data

- If you want to link milling data, first click on the **Link milling data** icon in the main menu.

**N.B.:** You can only link milling data if you have previously generated the data to be linked. The **ZENO®** CAM software **can only link data for the milling machine type ZENO® 4030**. For all other machine types the linking is done directly in the machine.

- Select **Generate milling data** from the window shown on the right and confirm your selection by clicking

Next

- The window shown on the right is called up. You can now select the required milling data file by clicking on the button

Open Nc-file

Then select a second file to be linked to the first by clicking the button

Open Nc-file

again. Continue in this manner until you have selected all the files to be linked.

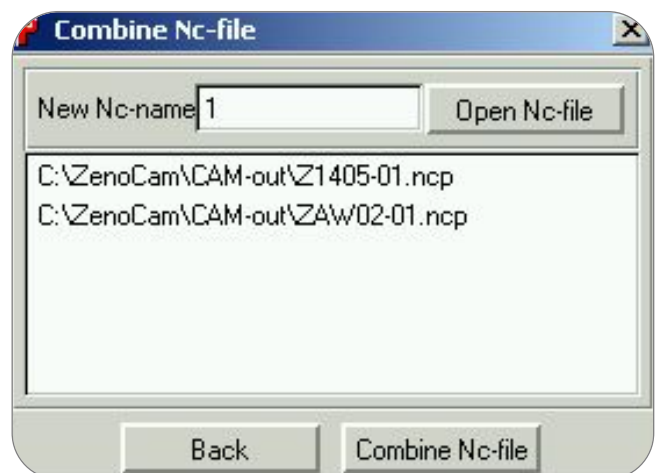
Finally click on the button

Combine Nc-file

The new file will now be created.

- The linked file has the name "1.ncp". If you want to link further files in this way, the old "1.ncp" will be overwritten.

**The data must then be loaded by the machine in order for the milling process to be carried out.**





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